English translation of priority document

FASTENER FOR AN ELECTRIC CONTACT

The invention relates to a weld-on fastener for an electric contact, in particular for an earth terminal.

Weld-on fasteners are used, for example, in automotive engineering, where they are used for producing an electric earth contact. It is known from EP 0 640 404 how an electric contact of this type is fastened to a metal sheet. To avoid soiling of the electric contact faces, a protective cap is applied to a stud provided with a thread. This stud with protective cap is then connected to the metal sheet by welding. The protective cap has, in particular, the task of protecting the thread of the stud from subsequent soiling, in particular paint which, when attaching the screws for a cable, would prevent an electric contact.

On the one hand, known earth studs of this type have a relatively high overall height, which is not always desirable. On the other hand, it is difficult to carry out the welding of known earth studs to metal sheets less than 0.6 mm thick. Furthermore, the connections produced can only absorb limited torques, in particular after welding to thin structures.

It is therefore the object of the invention to overcome the mentioned drawbacks and provide a weld-on fastener which allows secure attachment of an electrical contact with low overall height.

This object is achieved by the features of claim 1. Further advantageous configurations of the invention are the subject of the dependent claims.

The weld-on fastener according to the invention for an electric contact comprises a weld nut which, on its topside, has an electric contact face and, on its bottom side, has an annular axial projection which surrounds a cavity of predeterminable depth, and with a screw screwed into the weld nut, which screw also has an electric contact face, a spacer ring being clamped between the contact faces. The

nut, spacer ring and screw are handled, assembled as a unit and welded on. By welding the annular projection of the weld nut to a metal sheet, a larger external diameter of the welded connection is achieved in contrast to a comparably large conventional weld nut, so absorption of higher torques is achieved. The electric contact faces between screw and weld nut are protected from soiling with the aid of the clamped-in spacer ring. The contact faces therefore remain clean during transportation, during handling and during the welding process and later painting processes. A good quality electric contact can then be produced later by screwing off the screw, removing the spacer ring, applying a contact ring and re-screwing the screw tightly. A higher torque can be absorbed owing to the large diameter of the weld nut in contrast to a conventional weld nut which has smaller diameter as a rule. In addition, welds are possible herewith with smaller sheet metal thicknesses, i.e. less than 0.6 mm. Welding a nut with an annular projection, shapes and measurements suitable for this, and the requisite equipment are generally known in the state of the art.

A contact produced in this way is preferably an earth contact for voltages between 6 and 42 volt, in particular in a motor vehicle. The present invention is particularly suitable for applications of this type in mass production.

In a preferred embodiment of the invention, the spacer ring is made of elastic material, in particular polyethylene. A secure hold of the parts to one another can be achieved, therefore, in pre-assembly.

In a particular development of the invention, the spacer ring protects as a seal against wetting by paint and other soiling. This function is important if the workpiece, for example, receives one or more coats of paint before a contact ring is attached.

In a particularly advantageous development of the invention, the spacer ring has a thickness which is approximately equal to the depth of the cavity in the welded state. This is particularly significant in conjunction with a further preferred embodiment of the invention according to which the end of the screw ends

approximately flush with the end of the internal thread of the weld nut when the spacer ring is clamped. This means that during welding, neither the external thread of the screw nor the internal thread of the weld nut can be soiled by metal scabs. The screw can, therefore, later be easily screwed off and on again. After removal of the spacer ring and attachment of a contact ring, the screw cannot strike against the workpiece even when screwed completely tight, when the spacer ring is the above-mentioned size, as the end of the screw can project into the cavity by a maximum excess length corresponding to the thickness of the spacer ring minus the thickness of the contact ring. The given coordination of the measurements of all the parts with one another is therefore particularly advantageous for the present invention.

Finally, it is also favourable to make the external diameter of the annular projection larger than the external diameter of the other fastener. This allows adaptation to different work piece thicknesses and desired torques without changing the sizes of the contact faces.

Further special embodiments and advantages of the invention are described in the following drawings. Without limiting the invention, the drawings show one of many possible embodiments, in which drawings:

Fig. 1 is a longitudinal section of a weld-on fastener according to the invention, and

Fig. 2 shows the welded-on fastener according to Fig. 1, in which the spacer ring has been removed and an electric line fastened.

Fig. 1 shows a weld-on fastener according to the invention for an electric contact. It comprises a weld nut 1 which, on its topside has an electric contact face 9 and, on its bottom side, has an annular axial projection 6 which surrounds a cavity 4 of a pre-determinable depth T, and with a screw 3 screwed into the weld nut 1, which screw also has an electric contact face 9, a spacer ring 2 being clamped between the contact faces 9. The spacer ring 2 is formed in such a way that it substantially covers the contact faces 9 and is securely clamped in between them. Owing to the clamping

of the spacer ring 2, the screw 3 and weld nut 1 are braced against one another, so detaching the screw 3 from the weld nut 1 is prevented even under high mechanical loading (for example by vibrations during transportation or handling) due to comparatively high static friction. The spacer ring 2 seals the screw 3 from the weld nut 1 and prevents impurities and paint from penetrating to the contact faces and into the interior of the pre-assembled combination. The end 5 of the screw 3 with the external thread 13 ends flush with the end of the interior thread 12 of the weld nut 1. When welding onto the work piece 7 which can consist of a thin metal sheet, for example less than 0.6 mm thick, no metal scabs can therefore deposit in the threads and later impede disassembly or assembly. The thickness D of the spacer ring 2 is advantageously approximately as large as the depth T of the cavity 4. The screw can therefore later strike against an electric contact ring and not against the workpiece 7 when the spacer ring 2 is replaced.

Fig. 2 shows the completely assembled fastener according to the invention in Fig. 1, in which an electric line 10 is clamped with a contact ring 8 instead of the spacer ring 2 between the contact faces 9 of the screw 3 and weld nut 1. Relatively high currents can be conducted and high torques absorbed via the annular welded connection 11. The screwed-in screw 3 reaches a maximum excess length d into the cavity 4 with its end 5, which cavity 4 corresponds to the thickness D of the earlier spacer ring 2 minus the thickness of the contact ring 8 and therefore cannot touch the work piece 7 and therefore cannot damage the welded connection 11, if the spacer ring 2 previously had a thickness D approximately like the depth T of the cavity 4.

The invention is particularly suitable for application in mass production, in which automatic tools are worked with. The pre-assembled unit of weld nut, spacer ring and screw can be handled and welded like other welding parts and is suitable for welding to thin metal sheets, for contacts with low overall height and high load.

CLAIMS

1. Weld-on fastener for an electric contact with a weld nut (1) which, on its topside has an electric contact face (9) and, on its bottom side, has an annular axial projection (6) which surrounds a cavity (4) of a pre-determinable depth (T), and with a screw (3) screwed into the weld nut (1), which screw (3) also has an electric contact face (9), a spacer ring (2) being clamped between the contact faces (9).

2. Fastener according to claim 1, characterised in that the electric contact is an earth terminal, in particular for use in a motor vehicle.

3. Fastener according to claim 1 or 2, characterised in that the spacer ring (2) consists of elastic material, in particular polyethylene.

4. Fastener according to any one of the preceding claims, characterised in that the spacer ring (2) is designed as a seal for sealing the contact faces (9) against dirt or paint.

5. Fastener according to any one of the preceding claims, characterised in that the spacer ring (2) has a pre-determinable thickness (D) which is approximately equal to the depth (T) of the cavity (4) in the welded state.

6. Fastener according to any one of the preceding claims, characterised in that the weld nut (1) has an internal thread (12) and the screw (3) has an external thread (13), wherein the length of the external thread (13) is dimensioned in such a way that the end (5) of the screw (3) ends approximately flush with the end of the internal thread (12) of the weld nut (1) when the spacer ring (2) is clamped.

7. Fastener according to any one of the preceding claims, characterised in that the external diameter of the annular projection (6) is larger than the external diameter of the fastener in the remaining regions.

ABSTRACT

The present invention relates to a weld-on fastener for an electrical contact with a weld nut (1) which, on its topside has an electric contact face (9) and, on its bottom side, has an annular axial projection (6) which surrounds a cavity (4) of a predeterminable depth (T), and with a screw (3) screwed into the weld nut (1), which screw (3) also has an electric contact face (9), a spacer ring (2) being clamped between the contact faces (9). The spacer ring (2) preferably has a thickness (D) which is approximately equal to the depth (T) of the cavity (4). When the spacer ring (2) is clamped in, the screw (3) ends approximately flush with the end of the internal thread (12) of the weld nut (1). This combination is distinctive in that it has only a low overall height, no metal scabs reach the thread (12) during welding-on, the contact faces (9) are protected during assembly and the welded connection can absorb high torques even when welding onto thin work pieces (7).

(Fig. 1)